

Atty. Docket No. CPAC 1017-5
Appl. No. 10/632,552

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Remarks

The specification is amended herein to correct errors of a typographical or editorial nature. Claims 3 and 19 are amended to correct informalities, and claim 18 is canceled. No new matter is introduced by any of the amendments, and entry thereof is requested.

Claims 1 - 17 and 19 - 36 are in the application, of which claims 20 - 34 have been withdrawn as directed to a nonelected invention. Accordingly, claims 1 - 17, 19, 35 and 36 are now under consideration.

Applicant's invention is directed to multi-package modules (MPM) including stacked first and second packages, each of which includes a die attached to a substrate, in which the first and second substrates are interconnected by wire bonding, and in which the first package includes a flip-chip ball grid array package having a flip-chip in a die-up configuration. Advantageously, according to the invention, the second package and the first package can be separately tested before assembly, so that second packages not testing as "good" can be discarded and only "good" second packages used in the finished MPM.

The points raised in the Office action will now be addressed, beginning with the drawings objections.

Drawings Objections

(a) The drawings were objected to under 37 CFR 1.84(p)(5), the Examiner noting that the reference numerals "503" in Fig. 5A and "107" in Fig. 6D did not appear in the specification. The specification is amended herein to correct typographical or editorial errors in the identification of reference numerals. Particularly, in paragraph [0068], "adhesive 513" is corrected to read -- adhesive 503 -- ("513" refers to the die attach epoxy, *see, e.g.*, paragraph [0067]). And, particularly, in paragraph [0096], "MPM 1004" is corrected to read -- MPM 107 --, and "MPM 1044" is corrected to read -- MPM 109 -- ("1004" and "1044" refer to heat spreaders). This objection can now be withdrawn.

(b) The drawings were objected to under 37 CFR 1.83(a), the Examiner noting that the term "heat shield" in claim 19 was not particularly shown in the drawings. Claim 19 is amended herein to replace "heat shield" with -- heat spreader --. A heat spreader is shown in the Figures and

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is described in the specification with reference thereto (*see, e.g.*, Figs. 6D, 6E), and this objection can now be withdrawn.

In view of the foregoing, no changes in the drawings are required, and the objections to the drawings can be withdrawn.

Objections to the Specification

The specification was objected to because of "informalities", and corrections as suggested by the Examiner are made by amendment herein. Particularly:

(a) On page 5, line 3, "the metal layer 331" is replaced with --a patterned metal layer 331 --;

(b) On page 5, line 5, "a patterned" is replaced with -- the patterned --;

(c) On page 24, line 30, "Fig. 17" is replaced with -- Fig. 7 --.

The requested corrections having been made, these objections can now be withdrawn.

The specification was additionally objected to under 37 CFR 1.75(d)(1), the Examiner pointing out that the term "heat shield" in claim 19 did not have clear support or antecedent basis in the specification. Claim 19 is amended herein to replace "heat shield" with --heat spreader--. A heat spreader is shown in the Figures and is described in the specification with reference thereto (*see, e.g.*, Figs. 6D, 6E), and this objection can now be withdrawn.

Claims Objections

Claim 3 was objected to because of "informalities"; particularly the Examiner stated:

(a) Claim 3, line 1, the term "wire binds" is not consistent with recitations in other claims; and

(b) Claim 3, line 1, the term "the die" lacks antecedent basis, because there is more than one die in independent claim 1.

Claim 3 is amended herein to recite that the second package comprises wire bonds interconnecting the second package die and the second package substrate; and claim 3 is amended to recite -- wire bonds -- in place of "wire binds".

Wire "binds" was a typographical error, which is now corrected in claim 3. Applicants point out that claim 3 originally recited "the die and wire binds [*sic*] in the second package"; this meaning is made even clearer by the amendment herein. Applicants note further that the term "die" in this art is either singular or plural. A "wire bonded land grid array package" (claim 2) is

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understood to include a die interconnected to a substrate by wire bonds. The amendments to the claims are made as a matter of form only, and do not narrow any recitation of any claim.

The Examiner pointed out that claim 18 and claim 11 are substantially duplicative. Claim 18 is canceled by amendment herein, without prejudice or disclaimer.

The objections to the claims can now be withdrawn.

Rejections under 35 U.S.C. § 102(b)

Claims 1 - 5, 11, 12, 17, 18, 35 and 36 were rejected under 35 U.S.C. § 102(b) as being anticipated by Ozawa *et al.* U.S. 6,316,838 ("Ozawa"). These rejections are traversed.

Applicant disagrees with the Examiner's reading of Ozawa. As to claim 1, the Examiner asserted:

Ozawa *et al.* discloses in e.g., Fig. 6 a multi-package module comprising

- stacked first (21 and 33) and second packages (22 - 24),
- each said package including a die (23 and 21) attached to a substrate (24 and 33),
- wherein the first (33) and second (24) substrates are interconnected by wire bonding (32), and wherein the first package (21 and 33) comprises a flip-chip ball grid array package having a flip-chip (21) in die-up configuration (see Fig. 6).

Ozawa does not describe or suggest a multi-package module. Ozawa describes a stacked die package having a single substrate (33), in which the substrate (33) has a flip chip die (21) attached on one face and (in Fig. 6) three stacked die ("semiconductor elements") (24), (23), (22) attached on the other face. The feature having reference numeral 24 is not a substrate; it is a semiconductor die.

Applicant's claim 1 recites a multi-package module including stacked first and second packages, in which each said package includes a die attached to a substrate. That is, the first package has at least one die attached to a first package substrate, and the second package has at least one die attached to a second package substrate. As the application points out, this arrangement according to the invention advantageously allows for separate testing of the packages, so that only "good" packages are used for assembly of the multi-package modules.

Because Ozawa does not describe (or suggest) every feature of Applicant's invention as claimed, the rejection of claim 1 (and of claims depending from claim 1, and of claims 35 and 36, which incorporate claim 1) as anticipated by Ozawa should be withdrawn.

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Rejections under 35 U.S.C. § 103(a)

Claims 6 - 10, 13 and 19 were rejected under 35 U.S.C. § 103(a) for obviousness over Ozawa in view of Kakimoto *et al.* U.S. 6,333,552 ("Kakimoto"); claims 14 - 16 were rejected under 35 U.S.C. § 103(a) for obviousness over Ozawa in view of Lin U.S. 5,436,203 ("Lin").

As to claims 6 - 10, 13 and 19, Ozawa is applied as in the rejection of claim 1, and Kakimoto is relied upon (with reference to Kakimoto Figs. 3 and 7) as describing an electrical shield and an RF die in a flip chip package. As noted above, Ozawa fails to suggest or describe a multi-package modules having stacked packages and, as there is no suggestion in Kakimoto of stacked packages, Kakimoto cannot supply what Ozawa lacks. Accordingly, no combination of Kakimoto with Ozawa makes Applicant's claimed invention, and this rejection for obviousness should be withdrawn.

As to claims 14 - 16, Ozawa is applied as in the rejection of claim 1, and Lin is relied upon (with reference to Lin Fig. 1) as describing an embedded ground plane in a package substrate. As noted above, Ozawa fails to suggest or describe a multi-package modules having stacked packages and, as there is no suggestion in Lin of stacked packages, Lin cannot supply what Ozawa lacks. Accordingly, no combination of Lin with Ozawa makes Applicant's claimed invention, and this rejection for obviousness should be withdrawn.

In view of the foregoing, all the claims now in the application are believed to be in condition for allowance, and action to that effect is respectfully requested


This Response is being filed within the three months' shortened statutory period set by the Examiner for response to the Office action and, accordingly, it is believed that no extension of time or fee is required in connection with this paper. In the event the Examiner may determine that an extension of time may be required in connection with the filing of this paper, petition is hereby made therefor, and the Commissioner is authorized to charge any additional fee (or to credit any overpayment) to Deposit Account No. 50-0869 (CPAC 1017-5).

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If the Examiner determines that a conference would facilitate prosecution of this application, the Examiner is invited to telephone Applicants' representative, undersigned, at the telephone number set out below.

(Respectfully submitted,

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